DATE: April 4, 2005

TO: Doug Howard, Regional Administrator

FROM: Olga Lautt, Associate Engineer

SUBJECT: Max Herbold, Inc. – Wastewater Land Application Permit Application LA-000024-03 (Potato Fresh Pack Wastewater)

PURPOSE

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 for issuing wastewater land application permits. It states the principal facts and significant questions considered in preparing the draft permit conditions or the intent to deny, with a summary of the basis for the draft conditions or denial with references to applicable requirements and supporting materials.

PROCESS DESCRIPTION

Max Herbold, Inc. is a potatoes fresh pack facility and is located approximately two miles west of the city of Burley. The water used for washing the potatoes is pumped from a well located at the facility and stored in a water tower. The wash water is sent to a rock trap washer with static screens, and the wastewater is recycled for washing. After the water is reused several times, it is sent to a concrete silt settling pond. After settling, the wastewater is sent either to a holding pond for evaporation or directly to the land application site. See attached Figure 1 for a Wastewater Process Schematic. There is no data available to ensure that the seepage rates from all the wastewater storage and treatment structures do not impact negatively the ground and/or surface waters. The staff recommends that one of the compliance activities requires that those structures be seepage tested.

SUMMARY OF EVENTS

The site was first permitted to Del Monte, a vegetable processor, to land apply wastewater on April 19, 1989. Del Monte sold the facility to Max Herbold, Inc., during the summer of 1994. An application to land apply wastewater was received from Max Herbold Inc. on March 9, 1995. The WLAP permit LA-000024-02 was issued on July 6, 1995 and expired on July 1, 2000. The WLAP permit renewal application was submitted on December 3, 2002. As per IDAPA 58.01.17.400.01, the permit application was determined to be complete on May 27, 2004.

Max Herbold wastewater system has historically been operated at low loading. However, in the past several years, there have been instances of non-compliance such as: failure to submit annual reports by the required deadline, failure to perform the required monitoring and sampling, hydraulic loading and nitrogen loading limit exceedences, potential non-volatile dissolved solids loading limit exceedences.

SITE CHARACTERIZATION

SOILS

The land application site is located on soils known as Woodskow, Buko-Paniogue, Declo and Abo series. Woodskow is a sandy loam soil, deep, somewhat poorly drained, with moderately rapid permeability and with an available water capacity of 6 to 9 inches. Buko-Paniogue complex is a loam soil, deep, well drained with moderate permeability and with an available water capacity of 2.5 to 5 inches. Declo is a sandy loam soil, deep, well drained, with moderate permeability and an available water capacity of 7 to 9 inches. Abo is a loam soil, deep, moderately well drained, with moderately slow permeability, and with an available water capacity of 8 to 10 inches. The available water capacity (AWC) calculated for a depth of five feet for Field A and Field B resulted in a value of 8 and 9 inches, respectively. These available water capacity (AWC) values are adequate for the land application for a wastewater land application. The soil permeability varies between 0.6 and 2.0 inches/hour for the surface depths for Buki-Paniogue complex and 2.0 to 6.0 for Declo and Woodschow. Those values present a slight to moderate degree of limitation. For the subsoil, the permeability varies between 0.6 to 6.0 and 6.0 to 20.0 inches/hour. Those values present a slight to severe degree of limitation. The lower permeability has the potential of runoff vulnerability and the higher permeability may allow the contaminants to flow into ground water.

In the north-central end of field B there is a closed drainage area which has collected tailwater from previous agricultural and wastewater land application activities. This wetland is inventoried and classified as per USDI-Fish and Wildlife Service as a “PUSCh” wetland (i.e. palustrine, unconsolidated shore, seasonal, diked/impounded). See Figure 6 in the 2002 Permit Renewal Application for details.

A summary of the soil analysis concentration ranges at the land application site between the years 1996 and 2000 is presented below. The data used is for Field 1 only (south and north halves) and gives the percent change of various parameters analyzed between years 1996 and 2000. The percent changes are calculated with the formula %change in constituent=100*(yr2000-yr1996)/yr1996

Table 1

Constituent	% change	Depth: 0-12 inches	Depth : 12-24 inches	Depth : 24-36 inches	Lb/acre, in top 12 inches (min to max constituentX4)
Nitrate + ammonium-N	Field 1-south	(-6)	(-27)	(-78)	16.48 to 53.1
	Field 1-north	(-27)	(-39)	(-69)	
Phosphorus	Field 1-south	(-53)	(63)	(321)	59.6 to 188.4
	Field 1-north	(-65)	(115)	(561)	
Electrical conductivity	Field 1-south	(111)	(-23)	(-79)	NA
	Field 1-north	(99)	(-44)	(-81)	
SAR	Field 1-south	(-67)	(-52)	(-47)	NA
	Field 1-north	(-75)	(-49)	(-58)	
Iron	Field 1-south	(57)	(76)	(91)	NA
	Field 1-north	(1)	(30)	(148)	
Manganese	Field 1-south	(-46)	(-69)	(-50)	NA
	Field 1-north	(-49)	(-72)	(-53)	

(-) The negative sign denotes a decrease

As seen in Table 1 above, Nitrate-Nitrogen and Ammonium-Nitrogen concentrations decreased and the loadings are fairly low in the top 12 inches layer. The phosphorus concentrations decreased in the first foot but the concentrations did increase at high and very high rates in second and third layers, respectively. It appears that Phosphorus did travel through the soil profile. The data from 2000 sampling event indicates that the concentrations beyond first soil layer are high to very high. Although there is no P contaminant standard in the groundwater, there is concern that ground water with significant levels of P may potentially impact nearby surface water (Snake River in this case) if a connection between groundwater and surface water exists. The electrical conductivity is in an adequate range and there should be no adverse impacts to the crop growth. The Sodium Adsorption Ratio (SAR) is adequate for crop growth. As is seen in Table 1 above, manganese levels decreased and are in a moderate range value. The iron levels increased in year 2000 compared to year 1996, and are fairly high in the layer underlying the top twelve (12) inches of soil. This may indicate anaerobic conditions that developed in soil due to the past hydraulic or COD loads that were higher compared to the effective soil treatment potential. Prior to the potato fresh pack operation, the site received wastewater from a vegetable canning plant. Potassium appears in high levels, but it is less mobile than nitrogen. Leaching losses of potassium are not significant and have little potential to contaminate ground water.

Staff Recommends: 1) The permittee will perform soil sampling and analysis every other year at the wastewater land application site. 2) Supplemental water should be irrigated to avoid the nutrients built up in the soil and obtain a healthy crop. 3) The permittee should submit to the Department for review and approval an updated Waste Solids Management Plan. The Plan should demonstrate that all the waste solids will be utilized or disposed in a manner which will prevent their entry, or the entry of contaminated drainage or leachate, into the waters of the state such that health hazards and nuisance conditions are not created, and impacts on designated beneficial uses of the groundwater are prevented. No waste solids, dredgings or sludge will be land applied to the wastewater land application permitted sites.

HYDRAULIC LOADING RATES

The growing season for this land application is defined as the period between April 1 to October 31 (214 days). The non-growing season for this land application is defined as the period between November 1 and March 31 (151 days). The hydraulic maximum loading rates were calculated using these time periods.

Growing Season

The following equation was used for the hydraulic rate for the growing season: IWR=[Cu – (PPTe + carryover soil moisture) + LR]/Ei. IWR is the irrigation water requirement or the hydraulic loading rate for the growing season, Cu is the crop consumptive use, PPTe is the effective precipitation, LR is the leaching rate and Ei is the irrigation efficiency. It was assumed that the carryover soil moisture for the growing season was zero. Also, it was assumed that the leaching rate was zero. Using the Guidance for Land Application of Municipal and Industrial Wastewater – October 2004, the hydraulic rate for growing season was calculated.

Table 2

CROP	CU[a] (in.)	PPTe[b] (in.)	Ei[c] (%)	IWR (in.)	IWR[d] (MG)
Alfalfa, grass hay	36.45	3.53	82.5	39.90	107.3
Potatoes	28.3	3.53	82.5	30.02	80.7
Wheat	32.55	3.53	82.5	35.18	94.5

a – Estimating Consumptive Irrigation Requirements for Crops in Idaho, by R.G.Allen and C.E.Brockway, August 1983 (http://www.kimberly.uidaho.edu/water/appndxet/index.shtml)
b – Guidance for Land Application of Municipal and Industrial Wastewater – October 2004, Appendix D-1, Station 101303 (Burley Faa Ap); PPT,for GS=5.05 inches, assumed that PPTe=70% of PPT
c – Guidance for Land Application of Municipal and Industrial Wastewater – October 2004, Table 2 "Irrigation Application Efficiencies), page IV-7 (average efficiency for the linear move sprinkler irrigation)
d – The water volume calculation for the irrigation water requirement was done with the assumption that 98.7 acres (79.3 acres Field A and 19.4 acres Field B) of irrigated land would be utilized.

As it can be seen from Table 2, the maximum hydraulic loading rate for the growing season ranges from 30.02 inches (80.7 million gallons) to 39.9 inches (107.3 million gallons) depending on the crop. The projected wastewater to the land application site is 30 million gallons. The site will be permitted for a maximum hydraulic loading rate to the land application site, of up to the Irrigation Water Requirement (IWR) per year. From the evaluation of the calculated hydraulic rate for various crops, it appears that the maximum calculated hydraulic loading (39.9 inches, or 107.3 million gallons) rate is well above the projected hydraulic land application rate. The facility will provide enough supplemental water to raise a healthy crop.

Staff Recommends: 1) Limit the yearly hydraulic loading rates to IWR wastewater land application. No wastewater irrigation should be allowed during the non-growing season (November 1 and March 31 of following year). 2) The permittee should irrigate supplemental water to the 98.7 acres fields to ensure healthy crop and uptake the nutrients from the soil. 3) The permittee should prepare an updated Operation and Maintenance Manual (O&M Manual) for the wastewater treatment system, using the Guidance for Land Application of Municipal and Industrial Wastewater - October 2004, Plan of Operation Checklist (page V-13). Information regarding the wastewater flow monitoring and recording, flowmeters calibration should be included.

WASTEWATER QUALITY AND PROPOSED LOADING RATES

The wastewater characteristics are presented in Table 7, page 19 of the application and the proposed constituent loading rates are shown in Table 8, page 20 of the application. The data is summarized below:

Table 3

Constituent	Concentration ppm	Loading rates lbs/ac	
		Field A (79.3 acres)	Field B (19.4 acres)
Wastewater volume (million gallons)		24.1	5.9
Nitrogen, as TKN	12.6	32	32
COD (214 days, growing season) lbs/ac-day	199	2.4	2.4
Total P	4.75	12	12
TDS	848	2164	2166
NVDS	700	1776	1776

The proposed crops N and P uptake loadings were calculated and summarized in the following table:

Table 4

CROP	AVERAGE YIELD DRY MASS[a] (tons/acre)	%N on DRY MASS BASIS[b]	%P on DRY MASS BASIS[c]	N uptake (lb/ac/yr)	P uptake (lb/ac/yr)	150% N uptake (lb/ac/yr)	100% P uptake (lb/ac/yr)
Alfalfa, grass hay	5.0	1.87	0.21	187	21	281	21
Potatoes	7	0.30	0.04	42	5.6	63	5.6
Wheat	1.2	2.08	0.62	50	15	75	15

a – Typical yields were taken from Agricultural Waste Management Field Handbook, Part 651, pages 6-19 to 6-22 ;
b,c - %plant nutrient uptake were taken from Agricultural Waste Management Field Handbook, Part 651, pages 6-19 to 6-22

When comparing the proposed wastewater Nitrogen loadings to the crop uptakes, it appears that the alfalfa and wheat will uptake the nutrient loadings that would be land applied. Caution needs to be exercised when potatoes are grown since the proposed phosphorus loading (12 lb/acre-year) would exceed the crop uptake (5.6 lb/acre-year or 100% P crop uptake).

Staff recommends: 1) Perform soil sampling and testing to monitor Nitrogen and Phosphorus values and determine the Nitrogen and Phosphorus loading rates based on the irrigated wastewater volumes and quality. 2) The permittee should irrigate supplemental water to the 98.7

acres fields to ensure healthy crop, adequate yields and the uptake of the nutrients from the soil.

3) The Nitrogen and Phosphorus crop uptake will be calculated to determine the allowable wastewater loading limits.

The maximum annual loading application of phosphorus will be limited to 100% of the crop uptake (See below the discussion/justification).

The following table shows the historic, proposed wastewater loading rates, predicted crop uptake loadings, and proposed wastewater loading rate limits for the permit renewal:

Table 5

Parameter	Units	Historic rates 1996 to 2000	Proposed loadings	Predicted uptake Loadings (from Table 4)	Future Proposed Loading Rate
Hydraulic Loading Rate	Million gallons	6.607 to 14.95	30	na	Up to IWR
Total Nitrogen	lbs/acre-year	13.7 to 81	32	63 to 281	150% of crop uptake
Total Phosphorus	lbs/acre-year	2.63 to 30.2	12	5.6 to 21	100% of crop uptake
COD, GS average (214 days)	lbs/acre-day	0.8 to 5.94	1.4	na	50
TDS	lbs/acre-year	399 to 5424	2166	na	No limit established at this time

When the historic Total Nitrogen loading rate values in the above table are compared with the predicted uptake rate values, it appears that the proposed future loading rates are adequate. The N loading from the wastewater will be limited to 150% of the crop uptake.

Loading rate for chemical oxygen demand (COD) did range between 0.8 and 5.94 lb/ac-day, between years 1996 and 2000. The proposed COD loading for growing season is 1.4 lb/ac-day.

Those loadings are adequate for the land application of the wastewater during the growing season.

Historic and proposed application loading rates for phosphorus are low. The phosphorus soil concentrations are showing a decrease between 1996 and 2000 in the top 12 inches. However, the concentrations in the second and third foot did increase between 89% and 441% on average, for south and north sections of field A. This would indicate a P accumulation and transport through the soil profile. The values range between 37.2 and 53.8 ppm for the 12 to 24 inches depth and 28.1 to 40.6 ppm for the 24 to 36 inches depth.

DEQ developed phosphorus guidance for land application site for groundwater protection in December 2003. To address the ground water interconnection with surface water the guidance establishes a recommended phosphorus concentration level in the 24 to 36 inches depth layer. In this case (for plant available phosphorus by Olsen method, and groundwater depth greater than 5 feet) the threshold value should be 30 ppm. Based on the data collected at the site, the P levels indicate a possible groundwater concern.

Although there is no P contaminant standard in the groundwater, there is concern that that ground water with significant levels of P may potentially impact nearby surface water (Snake River in this case) because a connection exists between groundwater and surface water. For the future permit the wastewater P loading limit of 100% of P crop uptake will be established. For example, when potatoes are cropped the loading from wastewater and fertilizer will not exceed 5.6 lb/ac for Phosphorus.

Also, P will continue to be monitored in the soil. Since there is no Phosphorus data collected from the existing monitoring wells in the future permit Phosphorus will be required to be monitored.

The proposed TDS loading has been reduced from the maximum 5424 lb/acre historically calculated. The Non-Volatile Dissolved Solids (NVDS) loading is expected to be proportionally reduced. Also, the soil salinity measured through the electrical conductivity has been decreasing in the second and third foot by 33.5% and 80%, respectively, between 1996 and 2000 (see Table 1). At this time there will be no limit specified in the new permit.

Staff recommends: 1) The permittee will irrigate supplemental water to the 98.7 acres fields to ensure healthy crop, adequate yields and the uptake of the nutrients from the soil. 2) A flowmeter will be installed to quantify the exact amount of wastewater irrigated. 3) Wastewater should be monitored monthly, during land application. 4) Available plant Phosphorus will continue to be monitored in the soil. 4) Phosphorus will be required to be monitored in the groundwater wells.

GROUNDWATER

GEOLOGY AND HYDROLOGY

The geology and hydrogeology are described in CH2Mhill (1991). There are two aquifers in the area. The upper aquifer is in alluvial sands and gravels over Burley lakebed sediments. This unconfined aquifer is thought to be perched on a continuous 6-12 inch clay layer over basalt in the lake bed sediments. Flow is generally to the north, yet varies seasonally due to water levels in the Snake River, irrigation and canal recharge, and ponding of water in northern portion of the land application site. Water table depth varies across the site and throughout the year. It is from 10 to 25 feet below grade.

There are three shallow upgradient wells: domestic wells DM-4 and DM-7 and monitoring well MW-5. Following are the shallow down-gradient monitoring wells: MW-1, 2, 3, and 6.

The deeper regional aquifer is in Snake River basalt flows. Static water levels in wells completed in the regional aquifer are around 200 feet below grade in this area. Lindholm et al. (1983) states that the regional aquifer flows in a westerly direction. CH2Mhill (1993 Annual Report) indicates a northerly flow in the area of this site. Two monitoring wells on site (MW-4, upgradient and MW-7, down-gradient) and three deep domestic wells (DM-3, 5, and 6, upgradient) off site have characterized ground water quality in the deep aquifer.

Current Monitoring Well Network

Currently seven monitoring wells are required to be sampled by Max Herbold (last sampling event Sept 2000): MW-1, 2, 3, 4, 5, 6 and 7. The wells are required to be sampled twice per year in April and October. No sampling has been performed since September 2000.

During the month of October 1995 and 1999, the following domestic wells were required to be monitored: DM-1, 2, 3, 4, 5, and 6.

Monitoring Wells analysis results/trends

Both total iron (Fe) and total manganese (Mn) concentrations were found to be above ground water secondary standards (IDAPA 58.01.11.200b). The elevated metal concentrations are indicative of anaerobic conditions.

The nitrogen concentrations in the wells MW-1, MW-4, MW-5 and MW-6 ranged from 6.4 mg/L to 18 mg/L. Those concentrations are similar to those found in other shallow wells in Burley area. Nitrate concentrations at wells MW-2 and MW-3 are consistently below the laboratory detection limit of 0.1 mg/L.

TDS concentrations in wells MW-2, MW-4, MW-5 and MW-6 ranged from 433 mg/L to 743 mg/L and may represent ambient conditions. The elevated TDS concentrations in wells MW-1 and MW-3 resulted from high TDS wastewater applied during Del Monte operations.

A review of ground water quality information from monitoring wells at the site from April 1994 to September 2000 was conducted. The following trends are evident in the monitoring data:

Following are Joe Baldwin's conclusions from the memo regarding the groundwater at Max Herbold site (see enclosed full document in Appendix 2):

"In general, ground water quality several wells continue to show impacts from operations during the Del Monte period. Water quality improvements are not evident at some wells, and are occurring only very slowly at other wells.

Collection of samples for major ion analysis (calcium, magnesium, sodium, potassium bicarbonate, chloride and sulfate) would help to establish whether there are upgradient sources of poor quality water that are moving onto the land application site. This information also would help to determine the reason why nitrate concentrations are below laboratory detection limits at wells MW-2 and MW-3.The facility should continue to sample all monitoring wells for nitrate-nitrogen, chloride, iron, manganese and TDS as required in the previous permit. Also, samples should be analyzed for major ions once during the life of the permit. Ground water at the site discharges directly to the Snake River, so phosphorus should be analyzed in the samples."

Staff Recommends: 1) A Groundwater Monitoring and Sample Handling Standard Operating Procedures section needs to be included with the updated O&M Manual and submitted to DEQ for approval. The standard operating procedure section should address at minimum the decontamination of equipment prior to each use, well purging calculations and procedures, field records, sample collection and preservation, sample chain of custody.

BUFFER ZONES AND WELLHEAD PROTECTION

Field A is irrigated with a linear irrigation system, and Field B is irrigated with hand line sprinklers. Following table shows the recommended buffer distances between the land application site and various locations:

Buffer Object	Recommended Minimum Buffer Distance[1] (ft)	Existing Required Buffer Distance (ft)
Dwellings	300	300
Public access areas	50	50
Natural surface water bodies	100	na
Man-made irrigation conveyances	50	na
Domestic water supplies	500[2]	na
Public water supplies	1000[2]	na
Irrigation and Monitoring Wells	25[3]	na

1. Justification will be provided, by the permittee for review by DEQ, if permittee desires buffer distances less than those listed in the table above.
2. Unless a DEQ approved Well Location Acceptability Analysis indicates an alternative distance is acceptable.
3. Recommended to prevent the well from acting as a conduit allowing wastewater to reach the aquifer.

Staff recommends: The buffer zones will be maintained at the land application site as required. Justification will be provided, and approved by DEQ, for distances less than those shown in the table above.

SURFACE WATER CONSIDERATIONS AND FLOOD ZONES

The nearest surface water is Snake River, which runs along the north border of the land application site. The Snake River is protected with berms, a road, and a small buffer zone to prevent wastewater runoff.

According to the national wetland inventory map included in the application (Fig 6), there is a wetland in Field B and a small finger of it goes into Field A. In the national wetland inventory map, this wetland is classified as a PuSCh in the NWI key.

According to the flood plain map included in the application (Fig 7), the northern portion of the site along the riverbank is classified a zone A. Zone A is defined as areas of 100 year flood; base flood elevations and flood hazard factors not determined. The entire site except for about 20 feet along the riverbank is classified a zone C. Zone C is defined as areas of minimal flooding.

Staff Recommends: The permittee should employ Best Management Practices (BMPs) to prevent applied wastewater and any runoff from leaving the land application site. The BMPs should be included in the updated O&M Manual and submitted to DEQ for review and approved prior to implementation.

GRAZING

According to the Wastewater Land Application permit renewal documents grazing is not proposed at the wastewater land application site.

RECOMMENDATION

Staff recommends that the attached land application draft permit be issued, for the renewal of the Max Herbold, Inc. wastewater land application permit.

Appendix 1: Figure 1 (Site Map Location)
Figure 2 (Land Application Field Location)
Figure 3 (Wastewater Process Schematic)

Appendix 2: Memo – Joe Baldwin to Olga Lautt, dated June 30, 2004

cc: David Anderson, DEQ-Twin Falls Regional Office
Richard Huddleston, State Water Quality Office
Source file WLAP LA-000044-03 (SO&TFRO)

APPENDIX 1

Max Herbold, Inc.

Wastewater Land Application Permit

LA-000024-03

Site Maps

0 2000 FEET

(SOURCE: BURLEY SWID Aerial Photo,1992)

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Figure 1

Max Herbold Inc. Plant Location Aerial Photo

Drawn By: T. Scott

Date: 11/23/02

SES

Scott Environmental Services
800 North 3700 East
Menan, ID 83434

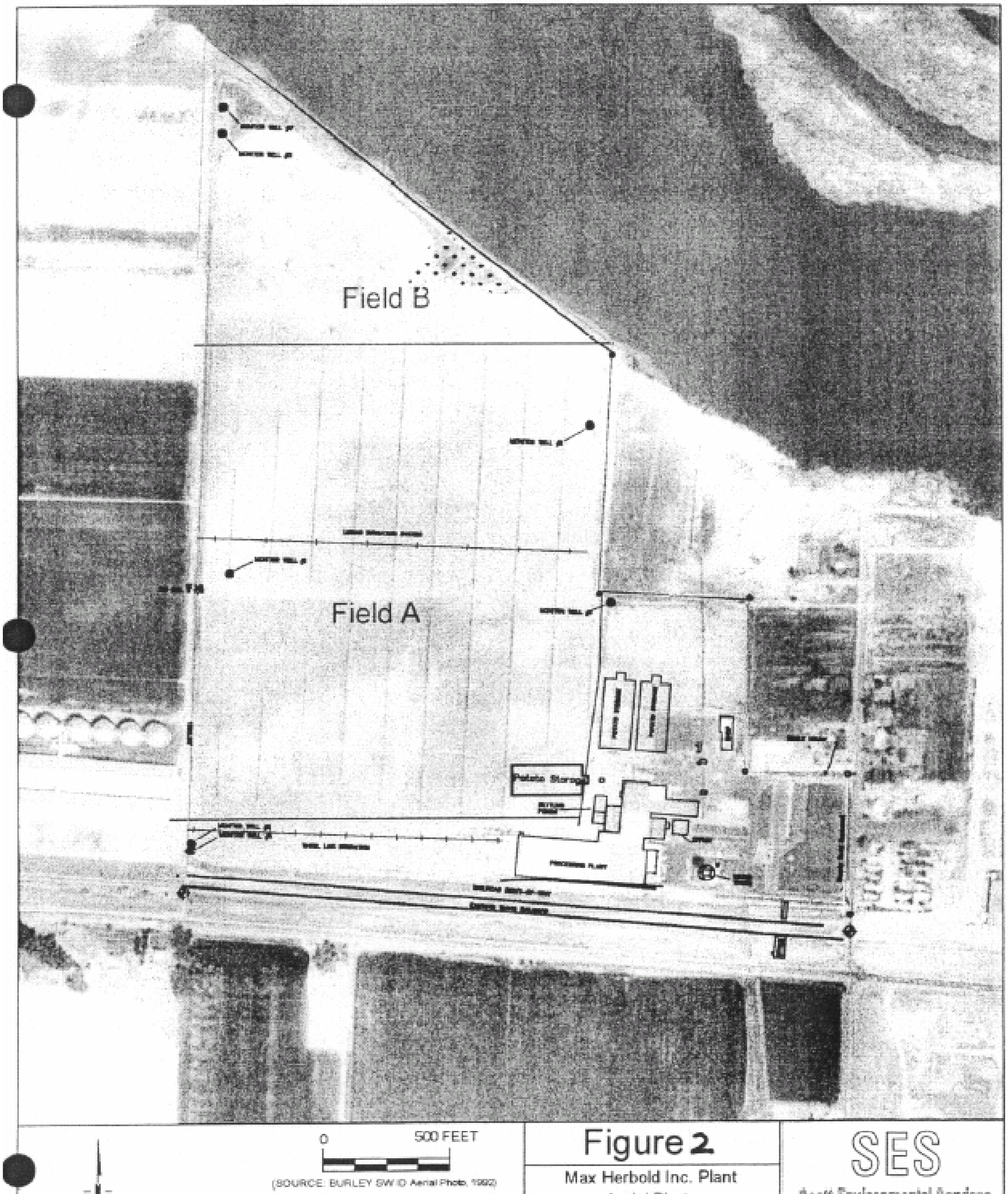

Figure 2

Max Herbold Inc. Plant
Aerial Photo

Drawn By: T. Scott

Date: 11/23/02

SES
Scott Environmental Services
696 North 3700 East
Menan, ID 83434

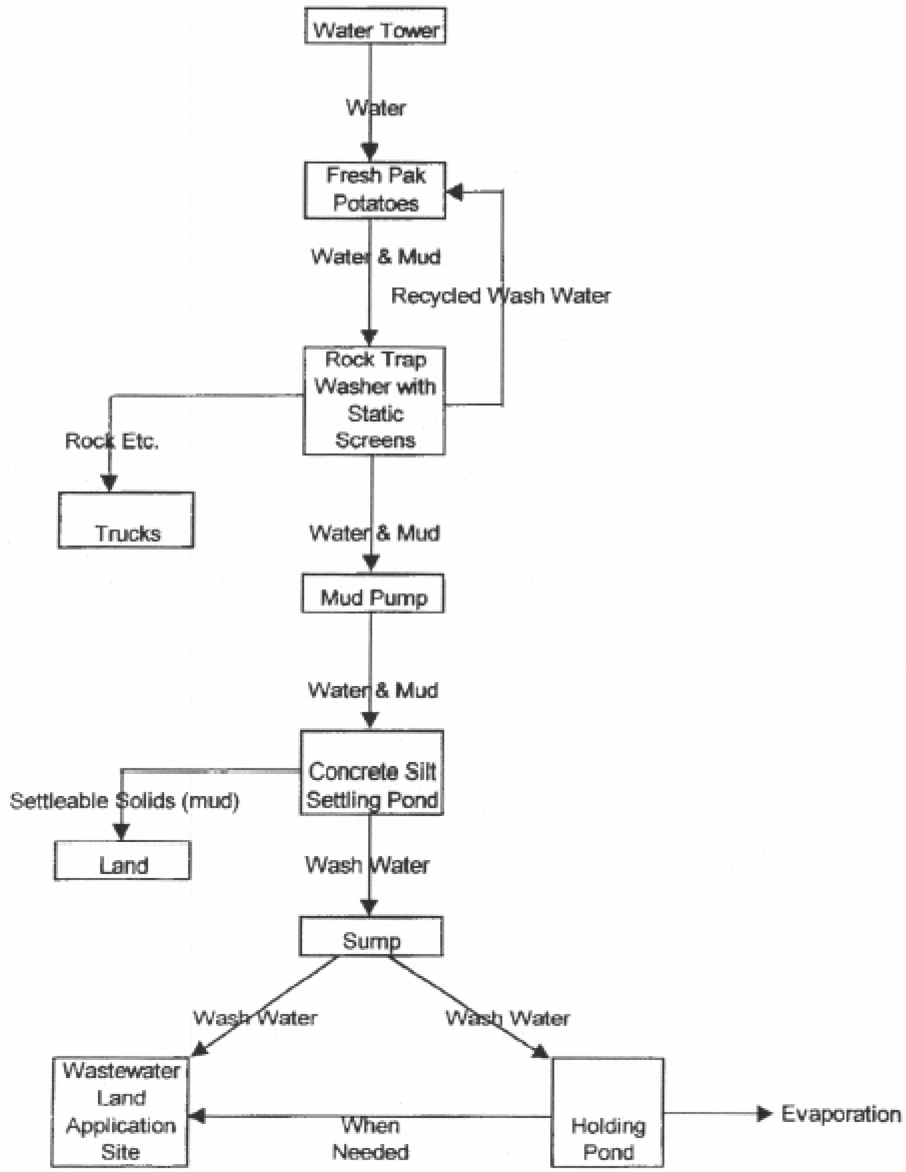

Figure 3
Wastewater Process Schematic
Max Herbold, Inc.
Scott Environmental Services

APPENDIX 2

Max Herbold, Inc.

Wastewater Land Application Permit

LA-000024-03

Memorandum from Joe Baldwin
(June 30, 2004)

Memorandum

To: Olga Lautt
Twin Falls Regional Office

From: Joe Baldwin, Technical Services

Date: June 30, 2004

Subject: LA-000024 (Max Herbold, Inc)

Introduction

This site had previously been operated by Del Monte Foods as a fresh food processing facility. Brine solutions used to sort food products were land applied during that operation. Ground water quality impacts from the application of the high-TDS wastewater were observed in monitoring wells at the site.

The site was purchased by Max Herbold Inc and has been used as a potato fresh pack operation. Continued ground water monitoring was required in the wastewater land application permit issued to Max Herbold, Inc. Annual reports have not been submitted by the facility for the years 2001 to the present.

A review of ground water quality information from monitoring wells at the site from April 1994 to September 2000 was conducted. The following trends are evident in the monitoring data:

Chloride – As of September 2000, chloride concentrations ranged from about 200 mg/L to about 800 mg/L at wells MW-1, MW-2 and MW-3 (Figure 1). Chloride concentrations declined to about 430 mg/L on September 2000, from a high concentration of about 850 mg/L at well MW-6. Ambient chloride concentrations appear to range from about 40 to 50 mg/L, as evidenced at wells MW-4, MW-5 and MW-6. The elevated chloride concentrations resulted from application of high-TDS wastewater during Del Monte operations.

Nitrate – As of September 2000 nitrate-nitrogen (hereafter - nitrate) concentrations at wells MW-1, MW-4, MW-5 and MW-6 ranged from 6.4 mg/L to 18 mg/L (Figure 2). Nitrate concentrations at these wells are similar to those found in other shallow wells in the Burley shallow aquifer. These elevated concentrations resulted from over application of agricultural fertilizer and or animal waste. Impacts from onsite wastewater treatment systems (septic tanks and drain fields) may also have contributed some nitrate to the shallow aquifer, but this source is probably small in comparison to agricultural impacts.

Nitrate concentrations at wells MW-2 and MW-3 are consistently below the laboratory detection limit of 0.1 mg/L. The reason for these low nitrate concentrations is unknown.

TDS – TDS concentrations in wells ranged from 433 mg/L to 2070 mg/L as of September 2000. TDS concentrations at wells MW-2, MW-4, MW-5 and MW-6, which ranged from 433 to 743 mg/L may represent ambient conditions (Figure 3). The elevated TDS ad Wells MW-1 and MW-3 resulted from high-TDS wastewater applied during Del Monte operations.

Iron and manganese – Several wells had iron and manganese concentrations that consistently exceeded the secondary iron and manganese MCLs for ground water. These elevated metal concentrations are indicative of anaerobic conditions. It is not known if these sample results are for total or dissolved metals. Samples should be analyzed for dissolved metals, and sampling problems, such as sediment generated during sample collection, should be noted.

In general, ground water quality several wells continue to show impacts from operations during the Del Monte period. Water quality improvements are not evident at some wells, and are occurring only very slowly at other wells.

Collection of samples for major ion analysis (calcium, magnesium, sodium, potassium bicarbonate, chloride and sulfate) would help to establish whether there are upgradient sources of poor quality water that are moving onto the land application site. This information also would help to determine the reason why nitrate concentrations are below laboratory detection limits at wells MW-2 and MW-3.The facility should continue to sample all monitoring wells for nitrate-nitrogen, chloride, iron, manganese and TDS as required in the previous permit. Also, samples should be analyzed for major ions once during the life of the permit. Ground water at the site discharges directly to the Snake River, so phosphorous should be analyzed in the samples.

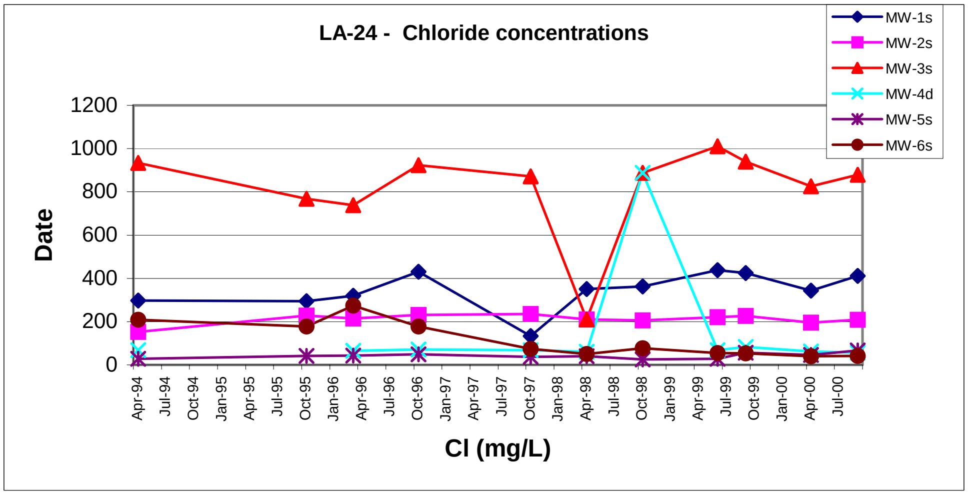

Figure 1. Chloride concentrations in monitoring wells at LA-24 (Max Herbold) wastewater land application site.

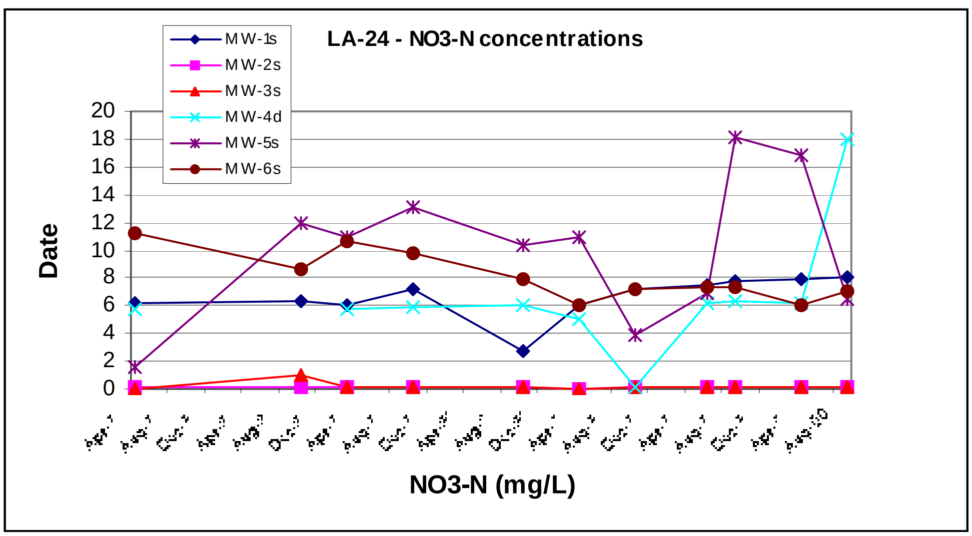

Figure 2. NO3-N concentrations at LA-24 (Max Herbold) wastewater land application site.

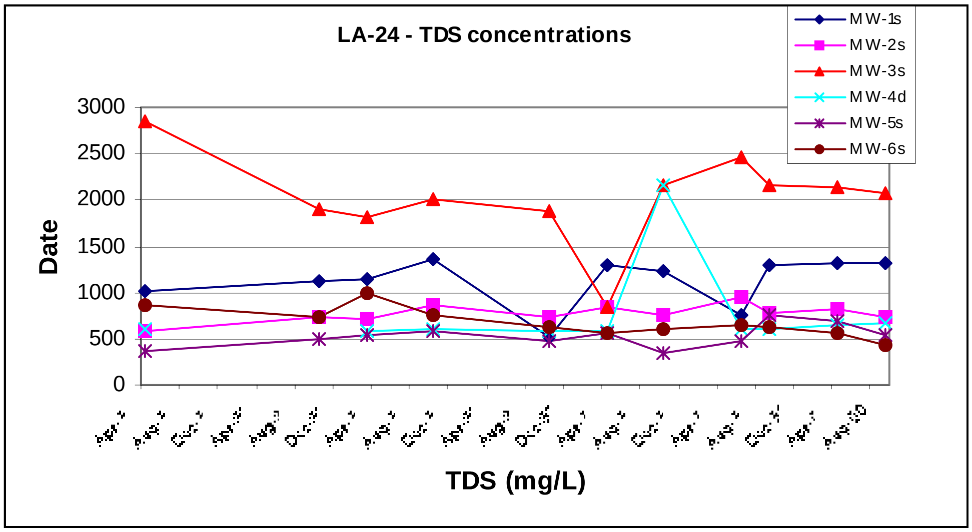

Figure 3. TDS concentrations at LA-24 (Max Herbold) wastewater land application site.